Assignment 2:

Quantitative Research Study

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Introduction

Children today are being brought up as digital natives in a world where they are expected to use technology on a daily basis and in a variety of settings. According to the NAEYC and the Fred Rogers Center, "technology and interactive media are tools that can promote effective learning and development when they are used intentionally by early childhood educators, within the framework of developmentally appropriate practice" (NAEYC, 2009).

Technologies dedicated to the treatment and education of children with Autism Spectrum Disorder (ASD) have been present in educational institutions and therapeutic practices for decades, however, studies involving the use of robots dates from 1999 and has gradually increased to date (Aresti-Bartolome & Garcia-Zapirain, 2014). The predictable behavior, controlled social situations, and simplistic interactions of robots make them a useful treatment option for children with ASD (Aresti-Bartolome & Garcia-Zapirain, 2014).

ASK NAO (Autism Solution for Kids) is designed to assist teachers and engage students with Autism and other cognitive disabilities in an educational program aimed at developing social and cognitive skills through encouragement, rewards and interaction with Nao through playing games ("New way of teaching? Ask NAO," n.d.). "The engaging, predictable and safe nature of robots suggests that robots could be a useful tool for teachers in special education especially when working with children with profound and multiple disabilities" (Hedgecock, Standen, Beer, Brown, & S. Stewart, 2014, p. 112). Children with disabilities are also being exposed to these technologies at home and in school, however, more research is needed to understand if these emerging technologies affect their rate of skill acquisition. This study will attempt to solidify this rationale and test the hypothesis.

Statement of the Problem

As a result of a brief examination of the literature on robotics and disabilities, many of the studies focus on Human-Robot Interaction (HRI), Robot-Assisted Therapy (RAT) and the use of socially assistive robots to alleviate or lessen the characteristics of ASD. Many of these studies have taken place outside of the United States. Few studies have been conducted that focus on using robots to increase communication, language acquisition or skill acquisition for students with ASD or other cognitive disabilities, especially in preschool-aged children. Assistive technology has historically been thought of as technology for special education, however, today it also encompasses instructional technology and universal design for learning (Edyburn, 2013).

Purpose of the Study

The purpose of this experimental study is to examine whether, through the implementation of a NAO Robot and ASK NAO software, preschool children with a disability could increase their rate of skill acquisition in comparison to preschool children with a disability who were not exposed to the NAO Robot and ASK NAO software.

Theoretical Framework

Howard Gardner's multiple intelligence theory has shown that because young children exhibit a diversity of learning styles, traditional teacher-directed and verbal approaches may not be optimal for many children (Wardle, 2007). The use of robots would serve to present young children with new skills in a non-traditional way. Additionally, Albert Bandura's Social Learning Theory, which portrays learning as being interactive and social in nature, is another framework that can be applied to the use of robotics and skill acquisition in this study.

Research Question

Will the use of a Humanoid Robot increase the rate of skill acquisition in students classified as preschool disabled and placed in a self-contained setting?

Null Hypotheses

There is no significant difference in the rate of skill acquisition between the students that are exposed to the NAO Robot and ASK NAO software during instruction as compared to the students that are not exposed to the NAO Robot and ASK NAO software during instruction.

Hypotheses

There is a significant difference in the rate of skill acquisition between the students that are exposed to the NAO Robot and ASK NAO software during instruction as compared to the students that are not exposed to the NAO Robot and ASK NAO software during instruction.

Independent and Dependent Variables

Independent Variables: Nao Robot, ASK NAO Software.

Dependent Variable: Rate of skill acquisition.

Significance of the Study

This study is significant in that it will add to the literature concerning developmentally appropriate technology use for children classified as preschool disabled. Research on the use of the Nao Robot has been previously studied with children classified with Autism Spectrum

Disorder, but there has been no research on the use of the Nao Robot and preschool disabled students. With the focus on both technology and early childhood, this study will help teachers of young children with disabilities develop activities and projects that could help involve children in active learning and encourages them to use higher-level thinking skills.

Develop a Statement of Resources

The primary sources used in this research project will be the data collected during the pre and posttests as well as the data produced by the NAO Robot software program. Secondary sources will be identified in reviewing the literature for this study. The researcher will focus on three key topics which will attempt to synthesize previous research and contribute to the overall structure of the study. Previous studies involving using humanoid robots with Autistic children will focus on Human-robot interaction, an increase in communication and the use of robotics in therapy sessions. The literature review will also attempt to look at how robotics have been used to support children with multiple disabilities. Finally, the researcher will investigate how technology has been previously used with preschool aged children. Key words will include: technology and preschool, disabilities, robotics, skill acquisition, humanoid robots and NAO.

Methodology

Philosophical Framework

The worldview a researcher adopts influences the research method used in a study. For this quantitative study, a postpositivist philosophical framework will be used. Through this philosophical lens, the researcher seeks to “identify and assess the causes that influence the

outcome" of this experimental study through "careful observation and measurement of the objective" (Creswell, 2014, p. 7).

Research Approach and Design

In this study, the researcher will use a quantitative experimental research approach with a pretest-posttest control group design.

Research Method

In this study, the researcher will randomly assign students classified preschool disabled aged 3 to 5 years old to two groups. Group one (the control group) will be introduced a new skill during regular classroom instruction by their teacher. Group two (the experimental group) will be introduced to the same skill using the Nao Robot.

Pre and Post tests will be conducted as well as data that is collected through the ASK NAO software will provide the quantitative data.

Data will be analyzed using a statistical software that will test the theory which has been presented. Implications and limitations of the research as well as recommendations for further study will be discussed.

References

Aresti-Bartolome, N., & Garcia-Zapirain, B. (2014). Technologies as support tools for persons with autistic spectrum disorder: A systematic review. *International Journal of Environmental Research and Public Health, 11*(8), 7767-802.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th. ed. ed.). Thousand Oaks, CA: Sage.

Edyburn, D. L. (2013). Critical issues in advancing the special education technology evidence base. *Exceptional Children, 80*(1), 7-24.

Hedgecock, J., Standen, P. J., Beer, C., Brown, D., & S. Stewart, D. (2014). Evaluating the role of a humanoid robot to support learning in children with profound and multiple disabilities. *Journal of Assistive Technologies, 8*(3), 111.

National Association for the Education of Young Children (2009). Developmentally appropriate Practice in early childhood programs serving children from birth through Age 8. Retrieved from the NAEYC March 16, 2016 from http://www.naeyc.org/files/naeyc/file/positions/PSDAP.pdf

New way of teaching? Ask NAO. (n.d.). Retrieved March 16, 2016, from https://asknao.aldebaran.com/

Social Learning Theory (Bandura). (2016, March 16). Retrieved from: http://www.learning-theories.com/social-learning-theory-bandura.html

Wardle, F. (2007). The Role of Technology in Early Childhood Programs. Early Childhood News. Retrieved from http://www.earlychildhoodnews.com/earlychildhood/article_print.aspx?ArticleId=302